A major contribution to the study of Roman vaulted architecture

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PAOLO VITTI, *BUILDING ROMAN GREECE: INNOVATION IN VAULTED CONSTRUCTION IN THE PELOPONNESE* (Studia Archaeologica 206; L'Erma di Bretschneider, Rome 2016). Pp. 432, pls. 10, figs. 313 (many in colour). ISBN 978-88-913-0951-8.

P. Vitti's new book explores the development of vaulted architecture in the Peloponnese during the Roman period. Focusing on those cities refounded after the Roman conquest and their nearby areas, it draws attention to the vaulted structures of bath halls, mausolea, nymphaea, and aqueducts built between the 1st and the 4th c. A.D. Many of these monuments have been published previously but most have never been analyzed from a construction point of view. The book fills this lacuna, providing a depth of observation and quality of graphic presentation rarely encountered in the field of Roman studies. Based on thorough on-site surveys, the author visualizes the original form and structure of the most important vaulted buildings in this area. For Vitti, however, reconstruction is not an end in itself: it is a tool for studying the structural behaviour of these monuments and recapturing the way in which they were built. This methodology transforms often inaccessible and dilapidated monuments into sources of information for the creative energy and technological skills of the builders of Roman Peloponnese.

The book opens with an account of earlier scholarship in the field of Roman construction. While this account does leave out certain important contributions,[1] it highlights those that have influenced the author's methodology, which include the works of Auguste Choisy and G. Giovannoni, as well as the recent volumes by L. Lancaster, all of which are discussed in detail.[2] The following chapter is devoted to the key elements of Roman construction. To do justice to such a variety of wall and vault structures within a few pages is challenging; non-specialists may find it difficult to follow the author's dense description of complex structures, materials and forms, even if the more committed reader will acquire a good sense of the development of construction technology from Republic to Empire, one that is essential for distinguishing the 'standard' building methods observed at Rome from those of the Peloponnese. The rôle of imperial and senatorial patronage is discussed in chapt. 2. Emperors such as Hadrian and senators such as Sextus Julius Antoninus transformed the urban landscape of this region, endowing it with some of the remarkable monuments investigated here.

Vitti has chosen his case-studies from different contexts: large cities like Argos and Corinth, smaller towns like Troezen and Gytheion, and the countryside. He examines major buildings such as the Baths of Argos, Corinth and Epidaurus, alongside a series of lesser-known but intriguing structures such as the Mausolea of Troezen. Detailed descriptions are liberally supported by excellent illustrations. Plans and sections are accompanied by outstanding axonometric drawings which have the ability to make the most complex structures accessible to non-specialists. Careful on-site surveys and reconstructions are documented by the author's

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1 Surprisingly, this section does not discuss some major contributions to the study of Roman building, such as those of J.-P. Adam, *Roman building: materials and techniques* (London 1994) or W. L. MacDonald, *The architecture of the Roman empire* (New Haven, CT 1982). The chapter by H. Dodge on Roman Greece ("Brick construction in Roman Greece and Asia Minor," in S. Macready and F. H. Thompson [edd.], *Brick construction in Roman Greece and Asia Minor* [London 1987]) could also have been discussed. Even though Dodge's and MacDonald's work are mentioned elsewhere in the book and are present in the bibliography, it would have been interesting to learn how they relate to the present study.

2 See A. Choisy, *L'art de bâtir chez les Byzantins* (Paris 1883); G. Giovannoni, *La tecnica della costruzione presso i Romani* (Rome 1925); L. Lancaster, *Innovative vaulting in the architecture of the Roman empire, 1st to 4th centuries CE* (New York 2015).

Fig. 1. The Great Hall of Bath A at Argos: view from the south (need source).

own line-drawings, sketches and annotated photographs, which make the book a useful reference for future researchers and provide inspiring leads. Each section begins with the GPS coordinates (for use with on-line mapping services) and bibliography, thoughtful additions that encourage and facilitate further study.

The plethora of the book's findings with regard to forms and structures is remarkable when one considers the ruined state of the monuments, most of which survive only up to the level of the springing of the vaults, or even lower; rarely does the crown of the vaults survive.[3] Vitti overcomes this obstacle by careful, evidence-based reconstruction which sheds new light on some key buildings. A good example is the 2nd-c. A.D. phase of Bath A at Argos (fig. 1). His reconstruction of the main, 10 m-wide vault over the Great Hall indicates the use of a special technique: bricks were not laid radially but were set on their edge to form vertical arched rings, as seems to be confirmed by the few remaining fragments of the vault and a comparison with the similar vault over the crypt in the same building.[4] The early use of this vaulting technique in the Roman Peloponnese, and especially at Argos, had already been noticed by H. Dodge,[5] but Vitti seems to be the first to draw our attention to the use in this region of a similar technique in "sail vaults" (i.e., pendentive domes). Rare traces of "pitched-brick sail vaults" are preserved in the NE Bath in the Sanctuary of Asklepios at Epidauros, as well as in one of the most ingenious buildings described here (pp. 163-70), Mausoleum RG5 at Troezen. Currently abandoned and inaccessible, this building is remarkably well-preserved. Here the builders broke with the

3 The best-preserved Roman building in the Peloponnese appears to be the bath in the Pamisos valley at Thouria, one of the major discoveries of the book under review (pp. 282-99). See further below.

4 Vaults consisting entirely of vertical brick courses are quite rare, as Vitti's findings in the Argos baths confirm. Indeed, in other rooms of the sample complex? vertical bricks are limited to the crowns of vaults, while the lower sections are often made of radial courses (pp. 112-13). In many cases, however, it is not clear if the radial courses are set parallel to the radius of the arch or if they are somewhat less inclined. My observation of a vault fragment lying on the ground east of the Great Hall seems to suggest that, even in the portions of vaults constructed with radial bricks, the bricks were kept almost parallel and somewhat less than normal? to the curve of the arch.

5 See Dodge (supra 1) 114. She does not give details about the structure of the vaults nor distinguish between vertical-brick and pitched-brick vaults. Vitti is the first to discuss these topics in detail.

standard Roman practice of supporting spherical vaults directly on walls[6] to place the spherical vault on broad arches, in a manner that prefigures Byzantine vaulting practices.[7] This pioneering design makes this mausoleum one of the most significant of the buildings that Vitti has rescued from oblivion by his careful reconstructions.

The originality of the book also resides in its attempt to recapture the way in which the monuments were built. An important question regards the use of timber formwork during the construction of vaults. Vitti identifies "self-supportive" vault structures made of pitched bricks. These structures point to a tendency to limit the use of centering, or even dispense with it, although this was not the case everywhere. In certain vaults, especially those built with concrete and with radial or vertical bricks, the author has found traces of the use of formwork, reflected in details such as putlog holes, recesses near the springing of vaults, and timber-board imprints on the intrados. Vitti's interpretation of such details is convincing, even if it is not always easy to establish the precise use of putlog holes, since they could have been associated with other kinds of scaffolding or temporary platforms.

The final chapters synthesize information drawn from disparate monuments by proposing a typological classification of vaulted forms and structures and discussing their origins and character. The book emphasizes the Peloponnese as a recipient of concepts developed in metropolitan Rome, for Roman officials and citizens were plainly the instigators of many building initiatives in the Peloponnese. One can also detect a broader Italian influence in the forms and structures of the Bath on the Lechaion Road at Corinth or those of the Bath in the Pamisos Valley at Thouria (pp. 202-45 and 282-99), buildings which feature concrete walls faced with bricks cut in a triangular shape, arches made of concrete with brick facing, and concrete barrel and groin vaults. The multi-axial layout? and apsed niches of these buildings are also reminiscent of architecture in Italy.

On the basis of these observations, the author attributes similar forms and structures to "professionals who came from abroad and introduced know-how and technology that was not in use prior to their arrival" (p. 333). While such an hypothesis may be relevant to particular buildings, its frequent repetition may prompt an assumption by the reader that the Peloponnese was little more than a passive receiver of ideas bestowed by the capital. The possible rôle of the Peloponnese as a generator of technological ideas deserves to have been further investigated. Indeed, Vitti shows that in certain structures Italian influences were either rejected or redirected. The persistence of ashlar masonry construction at Corinth is indicative of the resilience of local traditions.[8] His highlighting of the peculiar combination of brick and stone (in *opus reticulatum* and *opus incertum*) in funerary buildings at Patras (pp. 258-66), as well as the general preference for solid-brick vaults, suggests that Peloponnesian builders were not merely recipients of technological know-how. As he observes, the Roman Peloponnese saw some of the earliest adoptions of pitched-brick vaulting, a technique rarely found in Italy. This should suggest that the Greek province was not only importing ideas from the capital but was also open to influences coming from Egypt and Mesopotamia, where pitched-brick vaulting is thought to originate.[9] While all of these possible influences are discussed and illustrated here, they do not seem to receive the same emphasis as the Rome ones. Only a careful, critical reading reveals that the balance between Italian, local and eastern elements varied from building to building. This suggests that the Roman Peloponnese was a multicultural province, in which

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6 Typical examples of this practice are found in the Bath-Gymnasium complex at Sardis (2nd c. A.D.) (F. Yegül, *Baths and bathing in classical antiquity* [Cambridge, MA 1992] fig. 334), as well as in funerary architecture in Rome (G. Pelliccioni, *Le cupole romane: la stabilità* [Rome 1986] 40).

7 See N. Karydis, *Early Byzantine vaulted construction in the western coastal plains and river valleys of Asia Minor* (Oxford 2011) 162.

8 For a thorough study of the persistence of Hellenistic building traditions in Roman Asia Minor, see M. Waelkens, "The adoption of Roman building techniques in the architecture of Asia Minor," in Macready and Thompson (supra n.1) especially 98.

9 See J. B. Ward-Perkins, "Notes on the structure and building methods of Early Byzantine architecture," in D. Talbot Rice (ed.), *The Great Palace of the Byzantine emperors* (Edinburgh 1958) 53-104.

Fig. 2. NE Baths of the Sanctuary of Asklepios at Epidaurus: pendentive remains in Room F1 (need source).

local traditions were revitalized with influences from the East and with Roman forms and building methods. The question of the nationality of the builders and architects responsible for synthesizing these influences, however, should probably remain open until further evidence is available.

Vitti shows that many of the vaulted structures in the Peloponnese were repeatedly modified over the course of their long history, which sometimes extended down to the 6th c. A.D. In light of his close investigation of construction details, he often reconsiders the chronologies proposed by the excavators. Yet a dating of individual construction details, such as the pitched-brick spherical vaults at Epidaurus, has not always been possible (fig. 2).[10] It is to be hoped that Vitti's documentation will be combined with data from the excavations to re-establish a detailed phasing for the buildings, which would help provide a better sense of their place within the development of vaulted construction. It would also be interesting to investigate the legacy of vaulted construction in this region. That would involve the investigation of possible influences of Roman vaulted architecture on late-antique and Early Byzantine developments. The relationship between vaulted construction in the Peloponnese and that of W Asia Minor also deserves further exploration.[11] None of these is a simple task, but the book brings us closer to addressing them.

This book represents a major contribution to the study of Roman vaulted architecture and will long remain of great value to archaeologists and architectural historians interested in the history of construction technology. One of its main strengths lies in the author's intimate knowledge of the monuments, reflected in the thoroughness of his surveys and structural analyses. He brings many buildings back to life through well-founded reconstruction drawings, communicated in most cases through high-quality, three-dimensional diagrams. His illustrations set new standards for the presentation of similar topics.[12]

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10 Take the spherical vault of the NE Bath, for instance: it is not entirely clear if the spherical vault of Room F1 was part of the original design scheme or was added later. Cf. Vitti 186-90.

11 J. B. Ward-Perkins (*Roman imperial architecture* [London 1981] 276) claimed that fired brick was introduced to Asia Minor from the West but its use in vaulting first took shape in Asia Minor. For Ch. Delvoye ("Sur le passage des voûtes et des coupoles en briques de l'Anatolie à la Péninsule balkanique," *BCH* 100 [1976] 235-38), fired-brick vaulting was transmitted from Asia Minor to the Balkans. These theories were based on early instances of vaulted structures, including the substructures of the basilica at Aspendos (end of the 3rd c.) and the Temple of Asklepios at Pergamon (mid-2nd c.), but Dodge (supra n.1) 114 showed that some of the earliest examples of the use of fired brick in vaulting are to be found in Greece. This is now corroborated by Vitti's research in the Peloponnese, which renews our understanding of the origins and geographical range of this vaulting method. Waelkens (supra 11) 95.

12 Because of the book's strengths, it is possible to forgive the lack of an index or the small size of most of the illustrations. Still, there is no doubt that Vitti's excellent drawings deserved a larger format.